COALITION OF C-BAND CONSTITUENTS

February 18, 2004

VIA MESSENGER

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

Re: ET Dockets 98-153 and 02-380
Study of Interference by UWB and Unlicensed Devices
to C-Band Earth Station Receivers

Dear Ms. Dortch:

Submitted as Attachment 1 to this letter, on behalf of the Coalition of C-Band Constituents ("Coalition"), is a study conducted by the independent, expert laboratory, Alion Science and Technology ("Alion"), that quantifies the potential interference to satellite earth station receivers operating in the C-band frequencies (3700-4200 MHz) posed by operations on, or adjacent to, those same frequencies by Ultra-Wideband ("UWB") and other unlicensed devices. These interference issues were raised in the above referenced proceedings, and the Commission specifically invited studies, such as the one attached, in the UWB proceeding.

Despite the potential interference, the Coalition believes that with adjustments in the FCC's rules, UWB devices and C-band satellite services can co-exist in harmony. As discussed below, however, without such adjustments, the Alion study confirms that the reasonably anticipated deployment of UWB and other unlicensed devices operating in satellite C-band receive frequencies will cause destructive interference to satellite reception.

One way the Commission could alleviate the harm to television viewers and radio listeners who receive service from networks transmitted on C-band satellites is to require power reductions within C-band receive frequencies for those UWB devices that are likely to involve high-density usage. If power reductions within the relevant C-band receive frequencies are not practical for certain types of UWB devices, the Commission should consider mandating that those devices be designed to shift to other frequencies, including those used for C-band satellite uplink operations. No changes to the FCC's rules would be required to protect satellite operations from UWB devices used by fire, police and other safety–related forces.

1. Background

The Coalition is comprised of program networks and distributors, broadcast networks, satellite operators and others that use C-band frequencies for numerous satellite services. Coalition members provide and use satellite capacity for the distribution of news, sports, information and entertainment programming to broadcasters, multi-channel video programming distributors and ultimately to all television and radio audiences in the United States. A list of Coalition members is attached as Attachment 2.

In 2003, the Commission adopted a Memorandum Opinion and Order ("MO&O") amending, in some minor respects, recently adopted rules that allowed the unlicensed operation of UWB devices.[1/] The MO&O resolved several petitions for reconsideration of the previously adopted rules, including a petition filed by the Satellite Industry Association ("SIA"), which addressed the interference potential that UWB devices would create for C-Band operations. Although the FCC denied SIA's petition, the Commission stated that it:

> ..intend[s] to work with the FSS [Fixed Satellite Service] industry in developing an appropriate plan to perform further interference tests of UWB devices, including their potential impact on the reception of satellite signals. If our tests or other sources provide any indication that our standards are not adequate to protect any of the authorized radio services from harmful interference, we will take the appropriate action to protect those services.[2/]

2. Study Concludes That FCC Standards Are Not Adequate

The Coalition, which was formed in response to the MO&O, commissioned the Alion study to evaluate the "real world" effect of UWB and lower adjacent band unlicensed devices on C-Band earth station receivers. During the study, the Coalition and Alion sought the Commission's input and kept the FCC's staff informed of the study's progression.[3/]

The study conducted by Alion presents an in-depth analysis using a sophisticated model of predicted behavior in carefully defined scenarios. The scenarios were created to model real-world conditions. Many parameters were distinctly different from previous studies and were chosen by the Coalition and Alion to represent unbiased conditions – not the "worst case" assumptions regarding C-band receivers and UWB deployment. For example, in the study:

- UWB devices were modeled with isotropic antennas;

1/ *Revision of Part 15 of the Commission's Rules Regarding Ultra-Wideband Transmission Systems*, Memorandum Opinion and Order and Further Notice of Proposed Rule Making ("MO&O"), ET Docket 98-153, *18* FCC Rcd 3857, ¶ 1 (2003). In 2002, the FCC initiated a proceeding to examine the use of unlicensed devices in the lower adjacent C-band (3 GHz). See *In the Matter of Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band*, ET Docket 02-380, 17 FCC Rcd 25632 (2002).

2/ MO&O ¶ 131.

3/ Representatives from the Coalition met with various Commission staff on June 30, 2003 and representatives from Alion have been in contact with staff throughout the performance of the study.

- UWB devices were modeled to simulate network traffic using a random factor to simulate some devices transmitting and some devices receiving;

- UWB power levels never exceeded FCC-permitted levels and a random factor simulated UWB devices' propagation in relation to the C-band receiver;

- Propagation was modeled with a randomized factor simulating free space, foliage attenuation and building attenuation;

- UWB devices were varied in X, Y and Z location distributions around the C-band receiver, with a 30 meter exclusion zone, with random heights above ground representing single family homes, apartments and office buildings and with no transmissions in the receive antenna main beam;

- UWB devices had a pulse repetition frequency as would be encountered in an information-carrying modulation;

- Earth station elevation angles from 5º to 15º were included; and

- Link budgets used the necessary 3 dB margin, and a constant noise temperature was maintained at low elevation angles; i.e. the temperature did not increase as the elevation angle decreased.

The testing methods and results are detailed further in the enclosed study.

The study concludes that:

- C-band receiver reception failure will occur under circumstances where UWB devices operate at, or above, a density of 0.8 devices per acre within a five-kilometer radius of C-band earth stations. As earth station elevation angles increase, the UWB density likewise increases, but even at 15º elevation angles, reception failure still occurs at density levels far below those predicted to be encountered;

- Based on deployment trends for other affordable and popular networking technologies and wireless communications devices, the critical density level noted above is likely to be exceeded relatively early in the deployment cycle for UWB devices;

- In addition, while the critical density is exceeded in residential areas, the problem is compounded by the likely deployment of UWB devices in office and industrial parks and handheld UWB communications devices in vehicles on busy highways -- areas near the locations of C-band satellite receivers; and

- The effect on consumers will be the loss of video and/or audio reception in the case of digital C-band satellite receivers (now used by dozens of TV and radio networks

and increasing due in part to the digital television transition), and the appearance of "snow" or impulsive "sparkles" in the case of legacy analog receivers.

a. UWB Density Projection

The impact of UWB devices is dependent on the density and distribution of UWB emitters, which is unknown today, in the vicinity of C-band satellite receivers. The study postulates that UWB devices will reach a density similar to that of common wireless-based consumer items. At this density "FSS receivers will experience complete reception failure at currently regulated UWB power levels."[4/]

Some of the categories of UWB devices envisioned by the Commission are ground-penetrating radar, wall and through-wall imaging, surveillance and medical systems. Because these categories of UWB devices will be restricted to certain users (*e.g.*, law enforcement, public safety, construction, medical facilities) the deployment densities will likely not be great enough to cause interference problems. This is not the case with consumer communications and measurement systems, however.

One reasonable method for predicting the density of consumer UWB devices is by observing the growth of similar wireless applications. For instance it is likely that UWB devices will be used in cordless phone applications and wireless computing. Outside the home UWB will be applied to various automotive systems such as inter and intra-vehicular systems. Deployment of UWB systems in an office park for telephony, security and computing networks would greatly increase the density above that of residential use, and result in a higher interference level produced by UWB devices. Hand-held UWB devices used in vehicles also could increase the density of UWB devices and significantly interfere with C-band receivers in the vicinity of major highways and surface streets.

The following examples of density calculations are provided to illustrate the probable ubiquity of UWB devices:

- In a Presentation late last year, the Chief of the FCC's Office of Engineering Technology, Edmond Thomas, stated that, as of today, there are approximately 348 million Part 15 wireless devices within the United States. *Broadband Technology and Regulatory Policy*, Presentation by Edmond J. Thomas at the Bluetooth Americas Conference on December 11, 2003. Assuming approximately 108 million U.S. households, the calculation yields an estimated 3.2 devices per household, or in a typical urban/suburban setting of 4 households per acre, about 13 emitters per acre;

- In a residential community with 1/4 acre zoning, each residence in fact may include two cordless phones, a wireless computer and a handheld multimedia appliance being

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[4/] Alion Study at p. 6-1.

used simultaneously by the 4 inhabitants. This would result in a density of 16 devices per acre;

- In a typical low-rise office setting of 4 stories and a footprint of 11,200 square feet per floor (44,800 square feet total), an employee density of one per 200 square feet and a zoning of 25% land use, one out of two employees may be using a UWB device. This would result in a density of 56 devices per acre; and

- With UWB devices in motor vehicles, assume a one mile stretch of six-lane highway with bumper-to-bumper cars yields 189 cars per acre. (This assumes a vehicle 17 feet long with three feet between cars and a lane width of 3.5 meters (11.48 feet).) If 25% of the vehicles had UWB either built-in or operating from hand-held devices, the yield would be about 42 emitters per acre.

These densities far exceed the Alion-determined density for C-band reception failure.

b. Elevation Angles

Based on the orbital locations of C-band satellites carrying many of the country's major broadcast and cable television networks, video and audio reception will be lost in significant population centers if UWB devices are deployed in even lesser densities than projected in the preceding paragraphs. To illustrate, the Coalition analyzed elevation angles and population densities for six C-band satellites, AMC-8 at 139º W.L., AMC-7 at 137º W.L., Satcom C-4 (soon to be replaced by AMC-10) at 135º W.L., Galaxy IR (soon to be replaced by Galaxy XV) at 133º W.L., Galaxy XI at 91º W.L. and AMC-3 at 87º W.L. These particular satellites were selected because satellites at these orbital locations have been used for many years to carry much of the country's broadcast and cable television network distribution traffic. Particularly with respect to the western orbital slots (131º W.L. – 139º W.L.), the Commission from the earliest days of its satellite regulation, assigned satellites there that proposed to provide video services to all 50 states. See*, e.g., Assignment of Orbital Locations to Space Stations in the Domestic Fixed Satellite Service*, 84 FCC 2d 584 (1981). As a result of these Commission policies, certain portions of the orbital arc have developed into fully occupied program network "neighborhoods."

An illustrative example of the television services carried on these satellites is set forth in Attachment 3. These program networks and their affiliates have upwards of 100,000 C-band antennas pointed at these locations and many program networks have long-term commitments (10 – 15 years) to the satellite operators to continue their network transmissions from these locations.

As the maps in Attachment 4 reflect, destructive interference will occur to television and radio services on these satellites at low elevation angles (5º) in densely populated portions of the northeast, Alaska and Hawaii, when UWB consumer device densities reach 0.8 per acre. Even in cities with higher elevation angles, the interference will be fatal. In the Boston area for example, elevation angles reach 7.5º to 12.5º, and in New York, the nation's most densely

populated area, earth station elevation angles for major programming satellites reach 10º to 15º. In all of these areas, reception failure will occur at UWB densities far below what is projected to be encountered.

3. Workable Solutions Will Permit UWB Devices to Co-exist with C-Band Satellite Receivers

Despite this serious potential for harm to C-band satellite reception, the Coalition believes that interference from UWB devices can at least be mitigated, permitting many FSS receivers to coexist with UWB devices even if such devices become commonplace, so long as certain preventative measures are taken now, before UWB deployment becomes widespread.

First, UWB devices expected to be found in high densities that must operate at the emission power contemplated in the FCC's rules, should be required to be designed to emit in other frequency bands, such as C-band satellite transmit uplink frequencies (5925-6425 MHz).

Second, and to the extent those same UWB devices must operate in the C-band receive frequencies, the devices should be required to reduce their emissions within the band 21 dB below the power contemplated in the FCC's rules. According to the Alion study, this power reduction would prevent reception failure up to a UWB density of approximately 64 devices per acre. Although, this power reduction would not guarantee that C-band reception would not be lost in areas of higher density UWB deployment, the Coalition believes such a reduction would be a reasonable compromise to protect the C-band satellite links.

The Alion study demonstrates that the harm to C-band receivers by unlicensed UWB devices using the FCC's designated power levels is real, and the potential impact to C-band satellite services, especially television and radio transmission services, will be severe. If these issues are not addressed now, television viewers and radio listeners will begin to see and hear the results as UWB devices become more common, at which time it will be too late to correct the problem. The Coalition believes there are simple ways to mitigate these harms and allow C-band receivers and UWB devices to co-exist. The Coalition stands ready to assist the Commission to address these problems and to cooperate with the Commission and the UWB industry to craft a workable solution.

Respectfully submitted,

/s/ Benjamin Griffin

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Enclosures:

Attachment 1: Report of Alion Science and Technology
Attachment 2: Members of Coalition of C-Band Constituents
Attachment 3: Television and Radio Services on Certain Satellites
Attachment 4: Elevation Angles Population Densities

* Except for Fox Broadcasting Company and Fox Cable Networks.

ATTACHMENT 1

REPORT OF ALION SCIENCE AND TECHNOLOGY

ATTACHMENT 2

MEMBERS OF COALITION OF C-BAND CONSTITUENTS

COALITION OF C-BAND CONSTITUENTS

MEMBER COMPANIES

A&E
CBS
C-SPAN
Discovery
E!
Fox Network
Fox Cable
HBO
iNDemand
Lifetime
Loral Skynet
MTV
PanAmSat
Scripps Networks
SES Americom
Showtime
Starz!
USA
Warner Bros.

ATTACHMENT 3

TELEVISION AND RADIO SERVICES ON CERTAIN SATELLITES

PROGRAMMING SERVICES ON WESTERN ARC SATELLITES

AMC 8[1] (139° WL)	AMC 7[1] (137° WL)	SATCOM C4/AMC 10[1] (135° WL)	GALAXY 1R[2/] (133° WL)
Gavel to Gavel Alaska	KMGH-TV	AMC	Cartoon Network
University of Alaska TV	KDVR-TV	HITS	Cinemax (E)
KCAW-FM	Colorado Talking Books	Nickelodeon East	Classic Arts Showcase
KTOO-FM	WOKIE	Univision	CNN Airport
Alaska One TV	KCNC-TV	Univision Este	CNN en Espanol
KSKA-FM	KTUU-TV	Galavision USA Este	CNN Headline News
KUAC-FM	KTBY-TV	Galavision USA Oeste	CNNfn
TV Guide	KYES-TV	TeleFutura	CNNI
CBS Radio	KAKM-TV	The California Channel	Comedy Central (W)
Westwood Radio	KTVA-TV	Starz Encore	Disney Channel (W)
Infinity Radio	KIMO-TV	MoviePlex East	DIY Channel
ABC Radio	KUSA-TV	Starz! Cinema West	Encore (E)
	Fox Network	MoviePlex West	Encore (W)
	KWGN-TV	Starz! West	ESPN
		Starz! East	ESPN 2
		Black Starz! West	EWTN
		Starz! Family West	Food Network
		Encore West	GoodLife TV
		Starz! Theater West	HBO (E)
		WAM! West	HBO The Works
		Bravo US	Home & Garden Channel
		TV Guide	MSNBC
		QVC US	Nostalgia
		Home Shopping Network	Sci Fi Channel
		Speed Channel	STARZ!
		Tech TV US	Telefutura
		Travel Channel	The Inspiration Network
		Discovery Channel West	TNN (W)
		Animal Planet	TNT(W)

1 www.lyngsat.com and other SES Americom sources.

2 www.panamsat.com and other Panamsat sources.

AMC 8[1] (139° WL)	AMC 7[1] (137° WL)	SATCOM C4/AMC 10[1](135° WL)	GALAXY 1R[2] (133° WL)
		Discovery HD Theater	Turner Classic Movies
		The Learning Channel	Univision (E)
		BBC America West	Univision (W)
		Discovery Health	ValueVision
		HITS – Canales N	CMT (W)
		MTV East	USA (E)
		In Demand	USA (W)
		In Demand 11	
		In Demand 7	
		In Demand 8	
		In Demand 9	
		In Demand 10	
		In Demand 12	
		In Demand 13	
		In Demand 14	
		C-SPAN 3	
		C-SPAN 2	
		Discovery Channel East	
		Flix	
		VH1 East	
		CMT East	
		The Weather Channel	
		B.E.T.	
		Spike	
		Showtime	
		The Movie Channel	
		MSNBC	
		CNBC	

1 www.lyngsat.com and other SES Americom sources.

2 www.panamsat.com and other Panamsat sources.

PROGRAMMING SERVICES ON EASTERN ARC SATELLITES	
GALAXY 11[1] (91° WL)	**AMC 3[2] (87° WL)**
BET Action PPV	APTN Direct
BET on Jazz	APTN Washington
BET International	Michigan Government TV
BET (E)	WSBK-TV
BET (W)	Fox Sports Net North
Bloomberg Television	TVU
Christian TV NW	Comcast SportsNet MidAtlantic
Encore	Supercanal Caribbean
EWTN	WPIX-TV
Fox News Channel	Turner Classic Movies
Fox Sports Net	KTLA-TV
Fox Sports World Espanol	CNN Financial Network
FX Network (E)	InfoRadioNet
FX Network (W)	Moody Bible Radio 1
Game Show Network	Focus on the Family Radio Network 1
Independent Film Channel	Moody Bible Radio 2
International Channel	Salem Radio Network 4
Ovation	Salem Radio Network B
We	Ambassador 2
Shop at Home Network	Focus on the Family Radio Network 3
The Golf Channel	Salem Radio Network 2
Tri State Christian TV	Salem Radio Network 3
WB Network (E)	Ambassador 1
WB Network (W)	Salem Radio Network C
Yes Network	Focus on the Family Radio Network 2
	Salem Radio Network A
	The University Network

[1] www.panamsat.com and other Panamsat sources.

[2] www.lyngsat.com and other SES Americom sources.

ATTACHMENT 4

ELEVATION ANGLES/POPULATION DENSITIES